• Item 834-C

NS 1.2: H 36/979

AUG 21 1979

CLOSED-CYCLE HELIUM LIQUEFACTION SYSTEMS

COMPLETED

ORIGINAL

NATIONAL SCIENCE FOUNDATION
Division of Materials Research
Condensed Matter Sciences Section
Washington, D.C. 20550

NSF 79-23

15

IMPORTANT

The National Science Foundation, through the Condensed Matter Sciences Section of the Division of Materials Research, plans to assist the science community in the purchase of equipment to provide for closed-cycle helium liquefaction systems to be used in the support of basic scientific research. Components might include liquefiers, compressors, recovery equipment, storage Dewars and installation costs.

For a discussion of NSF policies pertaining to equipment, please refer to the Foundation's Grant Policy Manual (NSF 77-47 as revised).

The Foundation provides awards for research and education in the sciences. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for such findings or their interpretation.

A

INTRODUCTION

For the past several decades, helium gas has been a rather inexpensive natural resource, which when used by the scientific and technological communities of the United States, has usually been exhausted to the atmosphere. Unfortunately, this low cost helium supply is rapidly being depleted and it is expected that by the latter 1980's the demand will exceed supply.

In view of this situation the Condensed Matter Sciences Section, Division of Materials Research, of the National Science Foundation plans to provide funds in the amount of approximately $500,000 each year for a number of years to assist the scientific community of the United States in the purchase of equipment to provide for closed-cycle helium liquefaction systems to be used in the support of basic scientific research. This action has been taken to enhance the long-range scientific capability of the country by:

- o Protecting the scientific community against the anticipated precipitous increase in the cost of helium gas, and
- o Protecting the scientific community against the possibility that helium might become difficult to obtain, because of national priorities for energy or defense.

Several aspects of this program should be emphasized. They are as follows:

- o Since this is a long-term program, it is expected that INITIALLY preference for funding will be given to institutions at which the supply of liquid helium is presently relatively costly and/or unreliable.
- o Cost sharing by the institution involved is encouraged.
- o Multi-institutional proposals, in which one institution would have a liquefier and one or more other institutions would have ancillary stations, will be encouraged.
- o The system purchased will be required to have the capability of better than 90% recovery.

PREPARATION AND SUBMISSION OF PROPOSALS

A. WHO MAY SUBMIT

Proposals may be submitted by nonfederal United States institutions which require a liquid helium supply for basic research.

B. PROPOSAL CONTENT

A formal proposal should consist of the following items, assembled in the order shown:

1. Cover Sheet

   A completed cover sheet (see Appendix A) should be used as the first page of each submitted copy of the proposal. NSF requires that the original of each proposal for NSF support be signed by the principal investigator (PI), and the co-principal investigator if more than one principal investigator is involved in the project, and be endorsed by the authorized organizational representative or his designee. The original signed copy must be submitted to NSF.

   Submission of social security numbers is voluntary and will not affect the organization's eligibility for an award. However, they are an integral part of the NSF information system and assist in processing the proposal.

   The starting date of the project should take into account the time required for processing the proposal by the Foundation, as well as the availability of project staff, and should not normally be scheduled earlier than six months after the submission of a formal proposal.

2. Table of Contents

3. Abstract (not to exceed 200 words)

   This should be a self-contained condensation of the narrative. It should contain a minimum of technical terminology and include a concise statement of scientific objectives as well as a brief description of the proposed system.

4. Narrative

This section should include the following points:

a. A brief discussion of the scientific research projects which use the liquid helium, including the amount and source of external support.

b. A discussion of the need for such a system at the institution and a description of the proposed system, including

   i. A cost study outlining the budgeting procedure and the cost of manpower, capital equipment depreciation, makeup helium gas, liquid nitrogen, repair parts, power, overhead, etc.

   ii. A discussion of alternative sources of liquid helium, including cost and reliability.

c. A summary discussing the line of responsibility to guarantee long term effective use of the equipment and specific plans for maintenance.

Further information about proposal submission is given in the publication Grants for Scientific Research (NSF 78-41).

5. Budget

A budget should be prepared and submitted on the form shown in Appendix B. (See GPM 205.1, "Salary Information and Disclosure," for a clarification of the salary disclosure option. Significant or unusual items in the budget should be fully explained or justified, either as budget notes or in the text of the proposal.

Listed costs of the various line items should be known costs insofar as possible. The budget should not include items for expenses incurred before the date of the award, such as staff time required to prepare the proposal (see GPM 504.3, "Pre-award Costs"). Budgets should specifically list, as separately numbered items, any permanent equipment which will cost $1,000 or more. In addition, as stated in GPM 204.2, if a proposal for NSF support involves the purchase or lease of "expensive special purchase equipment" (having a unit acquisition cost exceeding $10,000) it must contain a certification by the authorized organization representative that the equipment is (a) essential and not reasonably available and accessible to the project and, if funded by NSF will be subject to (b) reasonable inventory control and maintenance procedures and (c) organizational policies designed to enhance multiple or shared use on other projects if such other use will not interfere with the work on the project for which the equipment is being acquired (see GPM 332 and GPM 512).

This program is designed to assist potential users in the purchase of capital equipment for the development of closed-cycle liquid helium facilities. No specific requirement of cost sharing is made but a substantial contribution from the user institution is taken to be a clear indication that the institution is committed to high quality research which requires liquid helium.

6. Personnel Description

A curriculum vitae should be prepared for all senior personnel on the project (whether actually receiving support or not). Each vitae should contain the following information: name, degrees (subject, institution, and date), professional experience (activity, institution, and date), and evidence of achievement (recent publications, papers, etc., limited to one page).

Each proposal must list all current projects, in addition to the one proposed, to which the senior personnel have committed a portion of their time, whether or not salary for the person involved is included in the proposed budget. This information should include the titles, beginning and ending dates of current grants or contracts, the source of funds, annual budget levels, and the amount of time (man-months) devoted to each project by each person of significance to the proposal. The proposal must also provide analogous information for all other proposed projects which are being considered by, or which will be submitted in the near future to other possible sponsors including other Foundation programs. Concurrent submission of a proposal to other organizations will not prejudice its review by the Foundation.

CLOSING DATE

Formal proposals will be considered each year and must be received no later than January 31.

SUBMISSION OF PROPOSALS

Fifteen copies of the formal proposal should be prepared and submitted by the proposing insitution to the address given below. The original signed cover sheet should serve as the letter of transmittal and the first page of the proposal. Each copy should be on standard (8 1/2 x 11) paper, stapled in the upper left corner. The copies are to be submitted securely bound in a single package to:

Central Processing Section
National Science Foundation
Washington, D. C. 20550

Also, please state on the package: For consideration by the Condensed Matter Sciences Section.

A check list for submission is given in Appendix C.

A separate information copy of the proposal, marked as such, should be sent directly to:

Condensed Matter Sciences Section
Division of Materials Research
National Science Foundation
Washington, D. C. 20550

EVALUATION OF PROPOSALS

Review criteria for proposals are derived from those announced by the National Science Board (Appendix D). Major criteria are the quality of the scientific research which requires liquid helium, cost savings which would result from acquisition of the facility and the effect of the current availability of liquid helium on the current research program. Additionally, because these are large scale equipment proposals, institutional setting, provisions for operation and maintenance and cost sharing will also be factors in the final decision. Proposals will be reviewed in the same way that other equipment proposals in the Division of Materials Research are reviewed.

FINAL REPORTS

Within 90 days following the expiration of the grant, the grantee must furnish NSF with the following, as described in GPM 674, "Procedures."

(1) Final disbursement information on the Federal Cash Transaction Report (SF 272). (See GPM 430).

(2) Final Project Report, NSF Form 98A (2 copies).

CONFIDENTIAL ASPECTS OF PROPOSALS AND AWARDS

Information that the Foundation and the grantee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law; therefore, an applicant who wishes to have the Foundation consider any information as privileged should refer to GPM 205.2, "Other Proprietary Information."

A proposal that does not result in an award may be retained by the Foundation. Such a proposal will be released only: (1) with the consent of the proposer; or (2) to the extent required by law. A proposal may be withdrawn at any time prior to final action thereon by the Foundation.

APPENDIX A

CLOSED-CYCLE HELIUM LIQUEFACTION SYSTEMS

Proposal to THE NATIONAL SCIENCE FOUNDATION
Condensed Matter Sciences Section, Division of Materials Research
Washington, D. C. 20550

Closing Date: JANUARY 31

Name and Address of Submitting Institution (to whom award should be made)

____

____

____

Title ______________________________

Requested Amount	Proposed Duration (mos.)	Desired Starting Date
____________	____________	____________

Principal Investigator ______________________________
(Name and social security number*)

PI's Department ______________________________

PI's Institution ______________________________
(If different from submitting institution)

Additional PI ______________________________
(Name, SSN and signature)

Additional PI ______________________________
(Name, SSN and signature)

ENDORSEMENTS:

PRINCIPAL INVESTIGATOR	DEPARTMENT HEAD	INSTITUTIONAL OFFICIAL
Name	Name	Name
Signature	Signature	Signature
Title	Title	Title
Telephone number	Telephone number	Telephone number
Date	Date	Date

* see note page 2

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APPENDIX B

SUMMARY
PROPOSAL BUDGET

ORGANIZATION AND ADDRESS	FOR NSF USE ONLY PROPOSAL NO.
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR	DURATION (MONTHS) PROPOSED / REVISED

NSF USE	A. SENIOR PERSONNEL (LIST BY NAME; SHOW NUMBERS OF PEOPLE IN BRACKETS; SALARY AMOUNTS MAY BE LISTED ON SEPARATE SCHEDULE) GPM 205.1b	NSF FUNDED MAN MONTHS CAL.	ACAD.	SUMR.	FUNDS REQUESTED BY PROPOSER	FUNDS GRANTED BY NSF (IF DIFFERENT)
	1. P.I./P.D.				$	$
	2. CO P.I./P.D.				$	$
	3. CO P.I./P.D.				$	$
	4. CO P.I./P.D.				$	$
	5. CO P.I./P.D.				$	$
11115	6. ( ) ← SUBTOTALS A1 - A5 →				$	$
	FACULTY AND OTHER SENIOR ASSOCIATES (ATTACH EXTRA SHEET IF NECESSARY)					
	7.				$	$
	8.				$	$
	9.				$	$
	10.				$	$
	11.				$	$
11117	12. ( ) ← SUBTOTALS A7 - A11 →				$	$
	B. OTHER PERSONNEL (LIST NUMBERS IN BRACKETS)					
11141	1. ( ) POSTDOCTORAL ASSOCIATES				$	$
11149	2. ( ) OTHER PROFESSIONALS				$	$
11150	3. ( ) GRADUATE STUDENTS				$	$
11152	4. ( ) UNDERGRADUATE STUDENTS				$	$
11182	5. ( ) SECRETARIAL - CLERICAL				$	$
11183	6. ( ) TECHNICAL, SHOP, OTHER				$	$
	TOTAL SALARIES AND WAGES (A+B)				$	$
11200	C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				$	$
	TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				$	$
	D. EQUIPMENT (LIST ITEMS AND DOLLAR AMOUNTS FOR EACH ITEM)					
23181	TOTAL EQUIPMENT				$	$
	E. MATERIALS AND SUPPLIES					
32630					$	$
	F. DOMESTIC TRAVEL					
42111					$	$
	G. FOREIGN TRAVEL (LIST DESTINATION AND AMOUNT FOR EACH TRIP; GPM 731)					
42112					$	$

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CANCELS NSF FORMS 98, 135, 569 AND 633 EFFECTIVE 10-1-77

SUMMARY PROPOSAL BUDGET

PROPOSAL NO.

52500	**H. PUBLICATION COSTS/PAGE CHARGES**	$	$
62315	**I. COMPUTER (ADPE) SERVICES**	$	$
	J. CONSULTANT SERVICES (IDENTIFY CONSULTANTS BY NAME AND AMOUNT; GPM 516)	$	$
	K. PARTICIPANT SUPPORT COSTS, IF ALLOWED BY PROGRAM GUIDE (ITEMIZE) GPM 518 1. STIPENDS $ ____ 2. TRAVEL $ ____ 3. SUBSISTENCE $ ____ 4. OTHER - SPECIFY $ ____ 5. TOTAL PARTICIPANT COSTS (K1 + K2 + K3 + K4)	$	$
	L. ALL OTHER DIRECT COSTS (List items and dollar amounts. Details of subcontracts, including work statements and budget, should be explained in full in proposal.) $ ____ $ ____ $ ____ $ ____		
65001	TOTAL OTHER DIRECT COSTS	$	$
	M. TOTAL DIRECT COSTS (A THROUGH L)	$	$
	N. INDIRECT COSTS (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs included in on/off campus bases in remarks.)		
74100	TOTAL INDIRECT COSTS	$	$
	O. TOTAL DIRECT AND INDIRECT COSTS (M + N)	$	$
74500	**P. LESS RESIDUAL FUNDS (If for further support of current project; GPM 252 and 253)**	$	$
75000	**Q. AMOUNT OF THIS REQUEST (O MINUS P)**	$	$

REMARKS

NOTE: SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPM 233). THIS IS REVISION NO.

SIGNATURE OF PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR	DATE OF SIGNATURE	TYPED OR PRINTED NAME AND TITLE
SIGNATURE OF AUTHORIZED ORGANIZATIONAL REPRESENTATIVE	DATE OF SIGNATURE	TYPED OR PRINTED NAME AND TITLE

FOR NSF USE ONLY

INDIRECT COST RATE VERIFICATION			PROGRAM OFFICER APPROVAL
Date Checked	Date of Rate Sheet	Signature	

Grant Number	Amend No.	Institution	Organization	Fund Acct.	Program	Object	

	Proposal Number	Dur.	Chg.	Award Date	Proposed Amount	Prpsd. Dur.	

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APPENDIX C

CHECK LIST FOR PROPOSAL SUBMISSION

Complete proposals help to expedite review and assist the applicant to meet a planned program. To assure that research proposals submitted to the Foundation are complete, an administrative check should be made prior to mailing.

( ) Cover page (use requested format)

( ) All required signatures

( ) Abstract (less than 200 words)

( ) Brief description of research which requires the use of liquid helium

( ) Vitae of all senior personnel

( ) Current list of main publications of senior personnel (major publications currently in press may be listed)

( ) Current support of senior personnel

( ) Budget (use required form)

( ) Brief description and justification of major items of requested equipment

( ) List or description of available facilities and/or equipment relevant to the proposed facility

( ) Equipment Certification, if a single piece of equipment costs $10,000 or more

APPENDIX D

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

NSF Criteria for the Selection of Research Projects

The following is an enumeration of criteria employed in the selection of research projects. To simplify later discussion, they are grouped in four categories.

Category A

Criteria relating to creative performance of research—the technical ability of the performer and adequacy of the institutional base:

I. potential for future accomplishment by the scientist based on the recent record of performance, experience, and training;

II. demonstrated awareness by the scientist of previous and alternative approaches to the problem;

III. adequacy of available or obtainable instrumentation, preparatory data, and technical support for the scientist.

Category B

Criteria relating to the internal structure of science itself:

IV. probability that the research will lead to important discoveries or significant conceptual generalizations within its field of science and, in most favorable cases, extending to other fields as well;

V. probability that the research will lead to significant improvement or innovations in investigative methods within its own field and possibly in other fields of science.

Category C

Criteria relating to utility or relevance to national objectives:

VI. probability that the research can serve as the basis for new inventions or improved technology;

VII. probability that the research will contribute substantially to technology assessment—i.e., to assessing or predicting the direct and indirect, intended and unintended, effects of existing or proposed technologies;

VIII. identification of an immediate programmatic context for, and user(s) of, the anticipated research results;

IX. probability that the research will assist in solving societal problems, in improving the knowledge base for national policies requiring science and technology, or in furthering the interests of international cooperation in science.

F.L. 100 (2-79) Supersedes All Previous Editions

Category D

Criteria relating to future and long-term scientific potential of the United States:

X. probability that the research will positively influence the capabilities, interests, and careers of participating graduate students, postdoctoral associates, or other junior research workers;

XI. probability that the research will contribute to a tradition of excellence in the field;

XII. anticipated effect upon the institutional structure of U.S. science; and

XIII. probability that funds allocated for the research will aid the effort to avoid undue concentration of scientific support in any region of the Nation.

Because none of thse considerations is susceptible to precise quantification, it would be more accurate to speak not of "criteria" but rather of "factors considered." Moreover, very different relative weights must be attached to the factors in the case of different Foundation programs. In the evaluation of unsolicited proposals for the support of basic research projects, the overwhelming emphasis is on "intrinsic scientific merit" (criteria IV and V). The expectation of competent performance (criteria I, II, and III) must always be present. Criteria X, XI, XII, and XIII also are considered with respect to each proposal. On the other hand, criterion VIII relates only to applied research projects and criterion IX relates primarily to policy research. Consideration is given to criteria VI and VII, not on a project by project basis but rather on the general level of effort to be applied to an entire field or subfield of science.

For group research proposals, the same standards and evaluation criteria apply. The individual parts must be of adequate quality in their own right, or of sufficient significance to achievement of the overall goals that the project could not be carried out without them.

In the evaluation of proposals for specialized research equipment, criteria IV and V, the scientific merit of the research for which the equipment will be used, are primary considerations. The likelihood that it will improve the quality or scope of the research also is important. Finally, the ability of the grantee to maintain the equipment and to use it fully, effectively, and efficiently is considered.

The award of NSF grants is discretionary. In general, proposals are supported in order of scientific merit to the extent permitted by available funds. For proposals of substantially equal merit as judged from the above criteria, consideration is given also to general subject matter coverage of grants made in that program.

90%

END

3-2-82